NOTE ON THE STRUCTURE OF *ANNULARIA AUSTRALIS*, FEISTMANTEL.

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(Plates II. & III.)

In his "Palaeozoische und Mesozoische Flora des östlichen-Australiens,"* Dr. Ottokar Feistmantel described a species of the well-known Equisetaceous plant *Annularia*, as *A. australis*.† In this genus the stem is articulate, possessing solid diaphragms at the joints, the former giving support to pinnate or bipinnate branches. The leaves are verticillate, and more or less obliquely articulate on the branches, whilst those placed laterally, in regard to their position on the branch, are generally longer than the others. Each leaf is always more or less elongate, always lanceolate, and traversed by a median nerve.

The specimens figured by Feistmantel were very fragmentary, consisting of six isolated, or partially isolated, whorls of leaves, and are from the Lower Coal Measures at Greta, associated with *Glossopteris*. It must not be forgotten, however, that the late Rev. W. B. Clarke, in his paper "On the Occurrence and Geological Position of Oil-bearing Deposits in New South Wales,"‡ mentions that the cannel coal at Reedy Creek is "in places full of fronds of *Glossopteris*, and a plant branching after the manner of *Asterophyllites*, which lies in perfect unrumpled

* 4to Cassel, 1878-79.

† Pl. 25, f. 6 and 6a.

‡ Quart. Journ. Geol. Soc. 1866, xxii. p. 445.

order. . . . The shales are impressed with *Vertebraria*, *Glossopteris*, and *Gangamopteris*." As there is some resemblance between *Asterophyllites* and the plant now under consideration, it is not impossible that the latter may be here referred to.

The specimens now exhibited are from the ever-productive collection of Mr. John Waterhouse, M.A., Inspector of Schools, by whom they were obtained in the new tunnel at Anvil Creek, above the coal seam; and enable me to figure a much more complete specimen than that available to Prof. Feistmantel. The first of these consists of a piece of shale covered with the leaf whorls. From these can be selected two branches, three and four inches long respectively, bearing leaf whorls *in situ*. In the former there are four remaining, and in the latter six. The whorls or verticels are on an average three-quarters of an inch apart, and most of them are twelve-leaved, but one or two have as many as twenty-four leaves. The leaves are elongately lanceolate, and, so far as I can see, possess no other structure beyond the midrib. An average length is from a half to ten-sixteenths of an inch, and with moderately acute apices. In the form and arrangement of the whorls our plant approaches *A. stellata*, Schlotheim (= *A. longifolia*, Brong.), but the number of leaves to a verticil in the former is only about half the number seen in the latter species.

The second specimen consists only of the stems, one well-marked example being six and a half inches long. In this length the stem is twice bipinnate, the length between each articulation, and in consequence of an internode, being two inches or thereabouts. The length of the branches, so far as they are preserved, is three and a quarter inches. The stem in its present compressed form possesses a width of three-sixteenths of an inch, but at each articulation broadens out to seven-sixteenths, or nearly half an inch; both it and the branches are longitudinally striate, probably representing during life delicate ridges separated by flutings. At a few of the nodes or articulations are the remains of verticils of leaves.

A second and much enlarged edition of Prof. Feistmantel's work is about to appear in English, published by the Government Printer for the Geological Branch of the Department of Mines.* From this I take the liberty of extracting the following remarks of Dr. Feistmantel's in advance :—

After again describing the fragment of *Annularia australis* as only known to him, the author remarks that Prof. Schmalhausen has described † a genus of Coniferous plants from the Jurassic rocks of the Altai Mountains as *Cyclopitys*, and like *Annularia*, with the leaves arranged in whorls. Dr. Feistmantel adds: "In a subsequent paper of his, Prof. Schmalhausen has brought my *Annularia australis* into close relation with his genus *Cyclopitys*. I am, however, not quite certain about this correlation, especially as I cannot remember having observed in the Australian specimens a transverse striation to both sides of the midrib of the leaflets, which Prof. Schmalhausen points out as a characteristic of his genus." ‡

The matter, therefore, stands thus :—We have on the one hand a supposed Equisetaceous genus *Annularia*, in which the leaflets simply bear a midrib without any transverse striation; and, on the other hand, a supposed Coniferous plant possessing similar leaves which are transversely striated. Both species described by Schmalhausen in the first of his quoted papers, viz., *Cyclopitys Nordenskiöldi*, Heer, sp., § and *C. Heeri*, Schm., ‖ show the cross striation of the leaf very distinctly. These leaves seem

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* Geological and Palæontological Relations of the Coal and Plant-bearing Beds of Palæozoic and Mesozoic Age in Eastern Australia and Tasmania, &c. *Mem. Geol. Survey N.S.W. No. 3 (in lit.).*

† Jura-Flora des Bassins von Kusnezk am Altai. (*Mém. Acad. Imp. Sc. St. Pétersbourg*, 1879, xxvii. No. 4.)

‡ Pflanzenpaläontologische Beiträge (*Bull. ibid.* 1883, xxviii. p. 426). [*teste Feistmantel*].

§ Jura-Flora des Bassins von Kusnezk, &c. *Loc cit.* pp. 41 and 88, t. 1, f. 4b'; t. 2, f. 1c. &c.

‖ *Ibid.* p. 88, t. 14, f. 9-14.

to have a much more coriaceous texture, judging from the figures just quoted, than do those of *Annularia australis*. An attentive examination of the specimens now under description has quite failed to detect any transverse veining of the leaves. The entire absence of such a striation becomes more marked from the definite outline of the midrib.

It would appear therefore that the reference of this plant by Prof. Feistmantel to *Annularia* is strictly accurate, and that it does not correspond to the structure of *Cyclopitys* of Schmal hausen.

EXPLANATION OF PLATES.

Plate II.

Fig. 1.—Foliage of *Annularia australis*, Feistmantel; nat. size.

Fig. 2.—Portion of a verticil enlarged to show the midrib of each leaflet, but without cross striation.

Plate III.

Fig. 1.—Stem with articulations, internodes, branches, and traces of leaves; nat. size.